



Daniel P. Schrag

**Science Talent Search 1984
MacArthur Fellow 2000**

Hear the word “snowball” and you might picture children playing in the snow. Daniel Schrag pictures planet Earth, around the end of the Proterozoic period, some 600 million years ago. The controversial theory he’s studying with colleague Paul Hoffman suggests that the Earth froze over from equator to pole and remained in this state for about 10 million years, until volcanic activity released enough carbon dioxide to raise the atmospheric temperature enough for the ice to melt.

According to Schrag, “The deglaciation would have occurred very rapidly and the Earth would end up in an ultra-greenhouse state. ... We proposed that this extreme climate fluctuation led to the emergence of metazoa, and ultimately to the Cambrian explosion that followed.” (The Cambrian explosion refers to the period when major groups of animals first appear in the fossil record.) *Snowball Earth Phenomena* is one of the courses Schrag teaches as a professor of Earth and Planetary Sciences and Director of the Laboratory for Geochemical Oceanography at Harvard University.

During high school Schrag worked in a neurology lab and competed in the 1984 Science Talent Search with a study of immunocytochemistry in the rat hypothalamus. “It turns out that the brain uses many different hormones as neurotransmitters to signal various types of nervous system responses.” He found being a finalist “added some useful confidence required to persist through the challenges one confronts in a scientific career.” After high school he studied geology, geophysics and political science at Yale, and completed his doctorate in geochemistry at the University of California at Berkley in 1993.

Named a MacArthur Fellow in 2000, Schrag was cited by the foundation for his “seminal contributions to our understanding of ancient climates, past and present climate change, and the relationship between science and policy. ... Schrag always couples an eye for important scientific problems with an ability to find practical solutions.”

Schrag’s research applies geochemistry to problems in paleoclimatology and oceanography on a variety of timescales. “One of the goals of my research program has been to develop new ways of extracting information about past climates.” This includes using corals as recorders of information on past and present climates. He is studying corals from the Red Sea, Indonesia and the Western Pacific to characterize seasonal and interannual climate variability through geologic time.

Schrag is known to enjoy nothing more than a debate of ideas and challenging assumptions. “At Harvard, my colleagues have created for me an intellectual playground.” During an acceptance speech last year for the Macelwane Medal (for significant contributions to the geophysical sciences) Schrag thanked no fewer than 75 people for their support. “For me, science is a social process. ... Ideas are created and refined from conversations with others.” In spite of his award-laden career, he says, “The most important satisfaction one can have from science does not come from prizes or awards, but from the excitement of a new discovery.”